



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 12, 2024 – 12:29 pm GMT

PDB ID : 8CG0  
Title : Crystal structure of S-adenosyl-L-homocysteine hydrolase from *P. aeruginosa* in complex with F2X-Entry library fragment H11  
Authors : Malecki, P.H.; Gawel, M.; Stepniewska, M.; Brzezinski, K.  
Deposited on : 2023-02-03  
Resolution : 1.60 Å (reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

---

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36

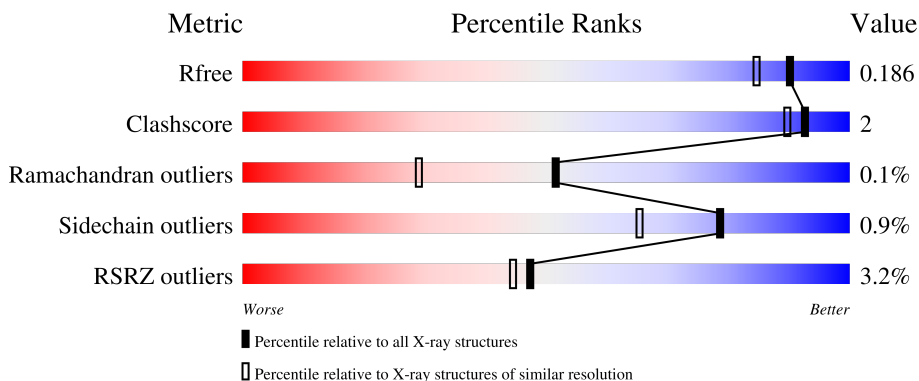
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.60 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	130704	3398 (1.60-1.60)
Clashscore	141614	3665 (1.60-1.60)
Ramachandran outliers	138981	3564 (1.60-1.60)
Sidechain outliers	138945	3563 (1.60-1.60)
RSRZ outliers	127900	3321 (1.60-1.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	472	 3% 95%
1	B	472	 0% 93%
1	C	472	 6% 94%
1	D	472	 3% 93%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	REG	D	504	X	-	-	-

## 2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 16375 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

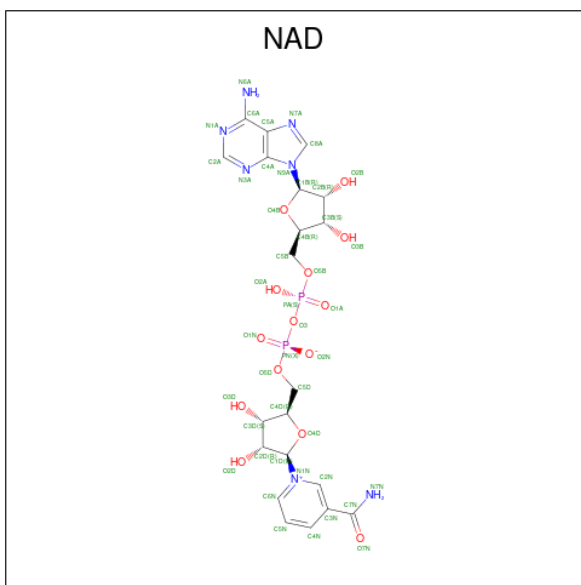
- Molecule 1 is a protein called Adenosylhomocysteinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	464	3608	2273	625	687	23	0	5	0
1	B	461	3597	2270	624	681	22	0	7	0
1	C	460	3588	2262	620	683	23	0	6	0
1	D	462	3596	2266	623	684	23	0	6	0

There are 12 discrepancies between the modelled and reference sequences:

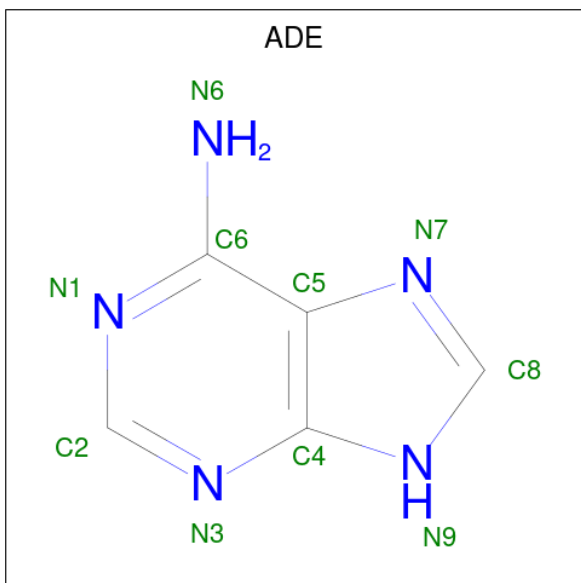
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP Q9I685
A	-1	ASN	-	expression tag	UNP Q9I685
A	0	ALA	-	expression tag	UNP Q9I685
B	-2	SER	-	expression tag	UNP Q9I685
B	-1	ASN	-	expression tag	UNP Q9I685
B	0	ALA	-	expression tag	UNP Q9I685
C	-2	SER	-	expression tag	UNP Q9I685
C	-1	ASN	-	expression tag	UNP Q9I685
C	0	ALA	-	expression tag	UNP Q9I685
D	-2	SER	-	expression tag	UNP Q9I685
D	-1	ASN	-	expression tag	UNP Q9I685
D	0	ALA	-	expression tag	UNP Q9I685

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: NAD) (formula: C<sub>21</sub>H<sub>27</sub>N<sub>7</sub>O<sub>14</sub>P<sub>2</sub>).



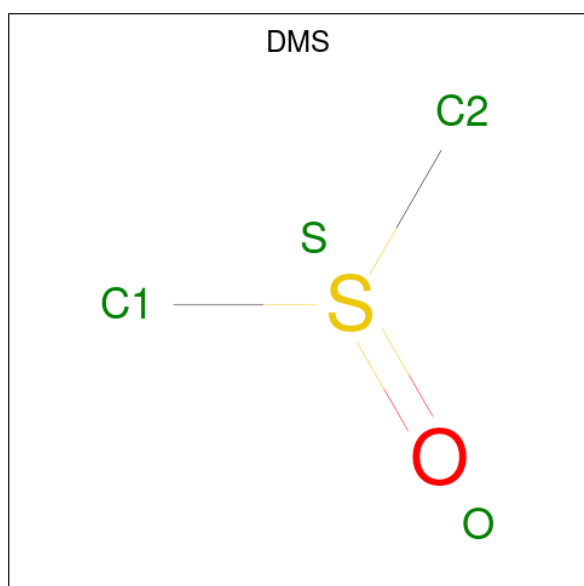
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf		
			Total	C	N	O			P	
2	A	1	Total	44	21	7	14	2	0	0
2	B	1	Total	44	21	7	14	2	0	0
2	C	1	Total	44	21	7	14	2	0	0
2	D	1	Total	44	21	7	14	2	0	0

- Molecule 3 is ADENINE (three-letter code: ADE) (formula: C<sub>5</sub>H<sub>5</sub>N<sub>5</sub>).



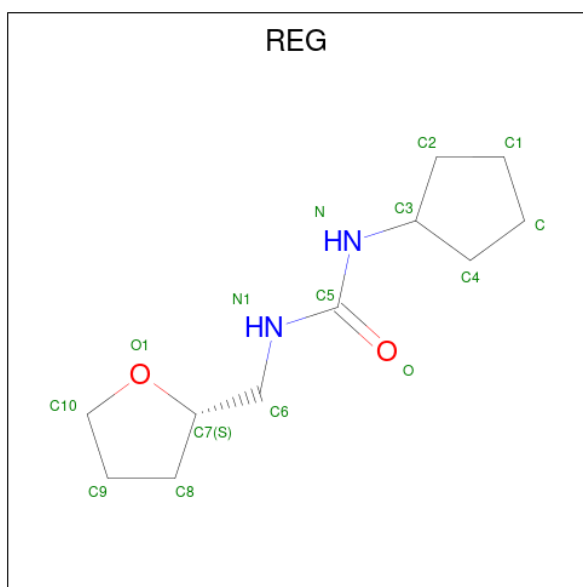
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			10	5	5		
3	B	1	Total	C	N	0	0
			10	5	5		
3	C	1	Total	C	N	0	0
			10	5	5		
3	D	1	Total	C	N	0	0
			10	5	5		

- Molecule 4 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C<sub>2</sub>H<sub>6</sub>OS).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	S	0	0
			4	2	1	1		

- Molecule 5 is 1-cyclopentyl-3-[[2 {S}]-oxolan-2-yl]methyl]urea (three-letter code: REG) (formula: C<sub>11</sub>H<sub>20</sub>N<sub>2</sub>O<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			15	11	2	2		
5	D	1	Total	C	N	O	0	0
			15	11	2	2		

- Molecule 6 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	K	0	0
			1	1		
6	B	1	Total	K	0	0
			1	1		
6	C	1	Total	K	0	0
			1	1		
6	D	1	Total	K	0	0
			1	1		

- Molecule 7 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	P	0	0
			5	4	1		
7	A	1	Total	O	P	0	0
			5	4	1		
7	A	1	Total	O	P	0	0
			5	4	1		
7	A	1	Total	O	P	0	0
			5	4	1		
7	B	1	Total	O	P	0	0
			5	4	1		
7	B	1	Total	O	P	0	0
			5	4	1		
7	B	1	Total	O	P	0	0
			5	4	1		
7	B	1	Total	O	P	0	0
			5	4	1		
7	C	1	Total	O	P	0	0
			5	4	1		
7	C	1	Total	O	P	0	0
			5	4	1		
7	C	1	Total	O	P	0	0
			5	4	1		
7	D	1	Total	O	P	0	0
			5	4	1		
7	D	1	Total	O	P	0	0
			5	4	1		

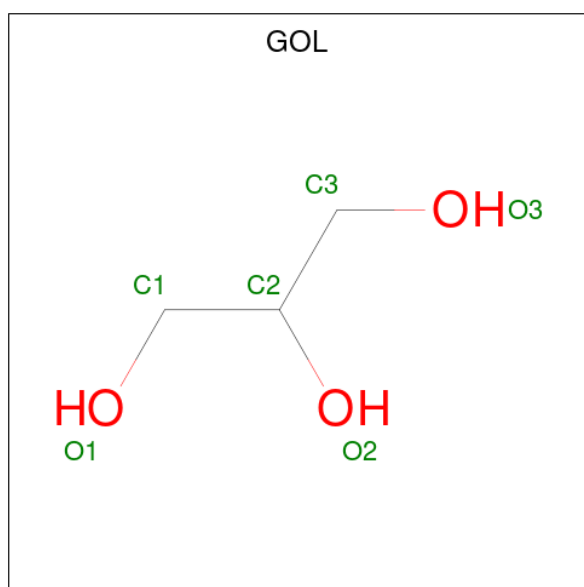
*Continued on next page...*



Continued from previous page...

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	D	1	Total O P 5 4 1	0	0
7	D	1	Total O P 5 4 1	0	0

- Molecule 8 is GLYCEROL (three-letter code: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C O 6 3 3	0	0
8	B	1	Total C O 6 3 3	0	0
8	B	1	Total C O 6 3 3	0	0
8	B	1	Total C O 6 3 3	0	0
8	D	1	Total C O 6 3 3	0	0
8	D	1	Total C O 6 3 3	0	0

- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	384	Total O 398 398	0	14

Continued on next page...

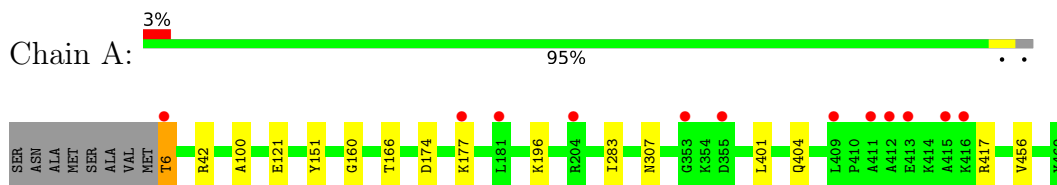
*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>		<b>ZeroOcc</b>	<b>AltConf</b>
9	B	424	Total 446	O 446	0	23
9	C	357	Total 364	O 364	0	7
9	D	398	Total 408	O 408	0	12

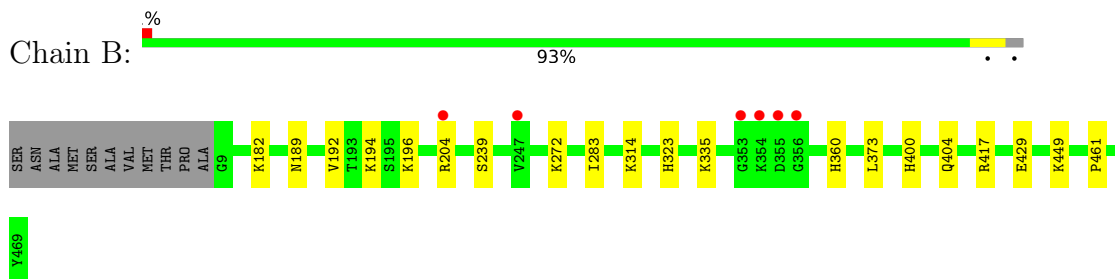
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

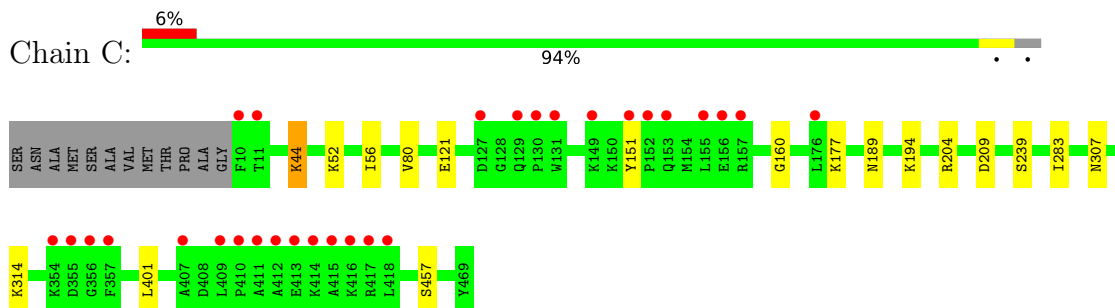
- Molecule 1: Adenosylhomocysteinase



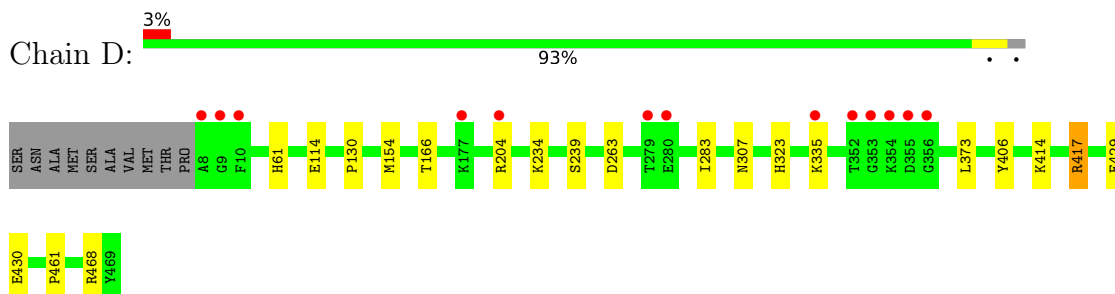
- Molecule 1: Adenosylhomocysteinase



- Molecule 1: Adenosylhomocysteinase



- Molecule 1: Adenosylhomocysteinase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	73.91Å 133.04Å 98.93Å 90.00° 101.21° 90.00°	Depositor
Resolution (Å)	32.35 – 1.60 48.52 – 1.60	Depositor EDS
% Data completeness (in resolution range)	98.4 (32.35-1.60) 98.4 (48.52-1.60)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.12 (at 1.60Å)	Xtrriage
Refinement program	PHENIX 1.19.2-4158	Depositor
R, $R_{free}$	0.157 , 0.186 0.157 , 0.186	Depositor DCC
$R_{free}$ test set	2558 reflections (1.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	23.8	Xtrriage
Anisotropy	0.332	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 51.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.98	EDS
Total number of atoms	16375	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	33.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.94% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GOL, NAD, DMS, PO4, K, REG, ADE

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	A	0.47	0/3678	0.62	0/4973
1	B	0.48	0/3678	0.64	0/4969
1	C	0.43	0/3663	0.60	1/4951 (0.0%)
1	D	0.46	0/3668	0.62	0/4957
All	All	0.46	0/14687	0.62	1/19850 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	209	ASP	CB-CG-OD1	5.21	122.99	118.30

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3608	0	3614	9	0
1	B	3597	0	3626	12	0
1	C	3588	0	3599	10	0
1	D	3596	0	3605	12	0
2	A	44	0	26	0	0
2	B	44	0	26	1	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	44	0	26	1	0
2	D	44	0	26	0	0
3	A	10	0	4	0	0
3	B	10	0	4	0	0
3	C	10	0	4	0	0
3	D	10	0	4	0	0
4	A	4	0	6	0	0
5	A	15	0	0	0	0
5	D	15	0	0	1	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	1	0	0	0	0
6	D	1	0	0	0	0
7	A	20	0	0	2	0
7	B	20	0	0	1	0
7	C	20	0	0	1	0
7	D	20	0	0	0	0
8	B	24	0	31	1	0
8	D	12	0	16	2	0
9	A	398	0	0	0	0
9	B	446	0	0	3	0
9	C	364	0	0	2	0
9	D	408	0	0	1	0
All	All	16375	0	14617	44	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 2.

All (44) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:174[B]:ASP:OD1	1:A:177:LYS:NZ	2.31	0.63
1:D:234:LYS:HD3	8:D:505:GOL:H2	1.82	0.61
1:A:6:THR:N	1:A:100:ALA:O	2.33	0.60
1:C:121[B]:GLU:OE1	1:C:151:TYR:OH	2.21	0.58
1:D:263:ASP:OD2	8:D:505:GOL:H11	2.06	0.56
1:B:192:VAL:HG13	1:B:196[B]:LYS:HG3	1.88	0.55
1:D:204[B]:ARG:HA	1:D:239:SER:HB2	1.93	0.51
1:B:323:HIS:HA	1:B:373:LEU:HD21	1.93	0.50
1:B:449:LYS:HD3	9:B:933:HOH:O	2.12	0.49
8:B:504:GOL:H11	9:B:955:HOH:O	2.13	0.48

Continued on next page...

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:204[A]:ARG:HA	1:D:239:SER:HB2	1.96	0.48
1:C:44:LYS:NZ	9:C:608:HOH:O	2.47	0.47
1:B:189:ASN:HA	1:B:194:LYS:HD2	1.96	0.47
1:B:429:GLU:OE1	1:B:461:PRO:HA	2.15	0.47
1:A:456:VAL:HG12	7:A:509:PO4:O3	2.14	0.46
1:C:194:LYS:C	1:C:194:LYS:HD3	2.36	0.46
1:B:182:LYS:NZ	9:B:602:HOH:O	2.37	0.46
1:A:160:GLY:HA3	1:A:401:LEU:HD13	1.98	0.46
1:C:56:ILE:HB	1:C:80:VAL:HG12	1.98	0.45
1:D:417:ARG:NH2	9:D:607:HOH:O	2.50	0.45
1:B:373:LEU:HD22	2:B:502:NAD:N7N	2.31	0.45
7:A:507:PO4:P	1:B:360:HIS:HE2	2.39	0.45
1:B:400:HIS:O	1:B:404[B]:GLN:HG2	2.16	0.45
1:A:404:GLN:HG3	1:A:417:ARG:NH2	2.31	0.44
1:C:189:ASN:HA	1:C:194:LYS:HD2	1.99	0.44
1:B:272:LYS:HE3	1:B:283:ILE:O	2.18	0.44
1:D:429:GLU:OE1	1:D:461:PRO:HA	2.17	0.44
1:C:204[B]:ARG:HA	1:C:239:SER:HB2	2.00	0.44
1:D:283:ILE:HG13	1:D:307:ASN:HB3	1.99	0.43
1:A:283:ILE:HG13	1:A:307:ASN:HB3	2.00	0.43
1:C:204[A]:ARG:HA	1:C:239:SER:HB2	2.01	0.42
1:C:314:LYS:HG3	7:C:504:PO4:O1	2.18	0.42
1:C:160:GLY:HA3	1:C:401:LEU:HD13	2.00	0.42
1:C:283:ILE:HG13	1:C:307:ASN:HB3	2.02	0.42
1:A:121:GLU:OE1	1:A:151:TYR:OH	2.36	0.42
1:A:404:GLN:HG3	1:A:417:ARG:HH21	1.85	0.42
2:C:501:NAD:H8A	9:C:756:HOH:O	2.20	0.41
1:D:323:HIS:HA	1:D:373:LEU:HD21	2.01	0.41
1:B:204[B]:ARG:HA	1:B:239:SER:HB2	2.02	0.41
1:D:406:TYR:CE1	1:D:414:LYS:HD3	2.56	0.41
1:A:196:LYS:HE3	1:D:468:ARG:HB2	2.03	0.41
1:B:314:LYS:HG3	7:B:508:PO4:O4	2.21	0.41
1:D:130:PRO:HB3	1:D:154:MET:SD	2.61	0.40
1:D:430:GLU:OE1	5:D:504:REG:N	2.55	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	467/472 (99%)	457 (98%)	10 (2%)	0	100	100
1	B	466/472 (99%)	457 (98%)	9 (2%)	0	100	100
1	C	464/472 (98%)	453 (98%)	11 (2%)	0	100	100
1	D	466/472 (99%)	457 (98%)	8 (2%)	1 (0%)	47	26
All	All	1863/1888 (99%)	1824 (98%)	38 (2%)	1 (0%)	51	29

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	61	HIS

### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	384/385 (100%)	381 (99%)	3 (1%)	81	70
1	B	384/385 (100%)	382 (100%)	2 (0%)	88	80
1	C	383/385 (100%)	379 (99%)	4 (1%)	76	61
1	D	382/385 (99%)	378 (99%)	4 (1%)	76	61
All	All	1533/1540 (100%)	1520 (99%)	13 (1%)	78	70

All (13) residues with a non-rotameric sidechain are listed below:



Mol	Chain	Res	Type
1	A	6	THR
1	A	42	ARG
1	A	166	THR
1	B	335	LYS
1	B	417	ARG
1	C	44	LYS
1	C	52	LYS
1	C	177	LYS
1	C	457	SER
1	D	114	GLU
1	D	166	THR
1	D	335	LYS
1	D	417	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 37 ligands modelled in this entry, 4 are monoatomic - leaving 33 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
7	PO4	C	505	-	4,4,4	0.89	0	6,6,6	0.86	0
7	PO4	A	507	-	4,4,4	0.95	0	6,6,6	0.68	0
8	GOL	B	501	-	5,5,5	1.16	0	5,5,5	0.61	0
7	PO4	D	507	-	4,4,4	1.13	0	6,6,6	0.43	0
7	PO4	A	508	-	4,4,4	1.16	0	6,6,6	0.75	0
7	PO4	A	509	-	4,4,4	1.16	0	6,6,6	0.66	0
4	DMS	A	503	-	3,3,3	0.75	0	3,3,3	0.85	0
7	PO4	B	509	-	4,4,4	0.44	0	6,6,6	1.62	1 (16%)
7	PO4	D	509	-	4,4,4	1.11	0	6,6,6	0.51	0
8	GOL	B	506	-	5,5,5	1.04	0	5,5,5	1.24	0
2	NAD	C	501	-	42,48,48	0.55	0	50,73,73	0.80	2 (4%)
8	GOL	B	504	-	5,5,5	1.36	1 (20%)	5,5,5	0.97	0
8	GOL	D	503	-	5,5,5	1.21	0	5,5,5	0.73	0
7	PO4	A	506	-	4,4,4	1.10	0	6,6,6	0.74	0
3	ADE	B	503	-	9,11,11	0.89	0	7,15,15	1.17	1 (14%)
7	PO4	C	504	-	4,4,4	0.97	0	6,6,6	0.47	0
2	NAD	A	501	-	42,48,48	0.67	0	50,73,73	0.85	1 (2%)
7	PO4	B	511	-	4,4,4	1.06	0	6,6,6	0.78	0
2	NAD	D	501	-	42,48,48	0.56	0	50,73,73	0.83	1 (2%)
3	ADE	C	502	-	9,11,11	1.10	1 (11%)	7,15,15	1.03	0
8	GOL	B	505	-	5,5,5	0.87	0	5,5,5	1.02	0
2	NAD	B	502	-	42,48,48	0.61	0	50,73,73	0.75	1 (2%)
3	ADE	D	502	-	9,11,11	1.00	1 (11%)	7,15,15	1.07	0
8	GOL	D	505	-	5,5,5	0.91	0	5,5,5	1.02	0
7	PO4	C	507	-	4,4,4	0.92	0	6,6,6	1.05	0
5	REG	D	504	-	16,16,16	3.51	10 (62%)	20,20,20	1.21	4 (20%)
7	PO4	D	510	-	4,4,4	0.92	0	6,6,6	0.85	0
7	PO4	B	508	-	4,4,4	1.05	0	6,6,6	0.79	0
5	REG	A	504	-	16,16,16	3.51	10 (62%)	20,20,20	1.44	4 (20%)
7	PO4	C	506	-	4,4,4	1.12	0	6,6,6	0.40	0
7	PO4	D	508	-	4,4,4	0.91	0	6,6,6	1.04	0
7	PO4	B	510	-	4,4,4	0.92	0	6,6,6	0.43	0
3	ADE	A	502	-	9,11,11	1.08	1 (11%)	7,15,15	1.11	1 (14%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	REG	D	504	-	1/1/3/5	1/9/23/23	0/2/2/2
2	NAD	A	501	-	-	5/26/62/62	0/5/5/5
2	NAD	D	501	-	-	5/26/62/62	0/5/5/5
8	GOL	B	501	-	-	0/4/4/4	-
8	GOL	B	506	-	-	3/4/4/4	-
3	ADE	C	502	-	-	-	0/2/2/2
5	REG	A	504	-	-	2/9/23/23	0/2/2/2
8	GOL	B	505	-	-	0/4/4/4	-
2	NAD	B	502	-	-	5/26/62/62	0/5/5/5
2	NAD	C	501	-	-	5/26/62/62	0/5/5/5
8	GOL	B	504	-	-	4/4/4/4	-
8	GOL	D	503	-	-	0/4/4/4	-
8	GOL	D	505	-	-	4/4/4/4	-
3	ADE	B	503	-	-	-	0/2/2/2
3	ADE	D	502	-	-	-	0/2/2/2
3	ADE	A	502	-	-	-	0/2/2/2

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	504	REG	C4-C3	-6.19	1.36	1.52
5	D	504	REG	C4-C3	-5.84	1.37	1.52
5	D	504	REG	C2-C3	5.44	1.66	1.52
5	A	504	REG	C2-C3	5.36	1.66	1.52
5	A	504	REG	C9-C8	-5.35	1.29	1.51
5	D	504	REG	C9-C8	-5.34	1.29	1.51
5	D	504	REG	C5-N	5.28	1.47	1.35
5	A	504	REG	C5-N1	5.21	1.46	1.35
5	D	504	REG	C5-N1	5.07	1.45	1.35
5	A	504	REG	C5-N	4.74	1.45	1.35
5	D	504	REG	O1-C10	3.73	1.54	1.42
5	A	504	REG	O1-C10	3.70	1.54	1.42
5	D	504	REG	C1-C2	-3.48	1.37	1.51
5	A	504	REG	C1-C2	-3.42	1.37	1.51
5	D	504	REG	O1-C7	-2.65	1.31	1.42
5	A	504	REG	O1-C7	-2.63	1.31	1.42
8	B	504	GOL	O2-C2	-2.51	1.35	1.43
3	A	502	ADE	C4-N3	-2.45	1.33	1.37
5	A	504	REG	C8-C7	2.29	1.63	1.52
3	C	502	ADE	C4-N3	-2.28	1.33	1.37
3	D	502	ADE	C4-N9	2.28	1.39	1.34

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	D	504	REG	C8-C7	2.26	1.63	1.52
5	A	504	REG	O-C5	-2.08	1.19	1.23
5	D	504	REG	C-C4	2.07	1.60	1.51

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	504	REG	C3-N-C5	-3.28	116.10	123.02
7	B	509	PO4	O3-P-O1	-2.86	100.43	110.89
5	A	504	REG	C2-C3-C4	2.60	108.50	103.34
5	A	504	REG	N1-C5-N	2.54	121.77	115.92
3	B	503	ADE	C5-C6-N6	2.40	124.00	120.35
2	D	501	NAD	C5A-C6A-N6A	2.34	123.90	120.35
5	D	504	REG	C3-N-C5	-2.31	118.15	123.02
2	C	501	NAD	PN-O3-PA	-2.29	124.95	132.83
5	D	504	REG	N1-C5-N	2.29	121.19	115.92
5	D	504	REG	O-C5-N1	-2.28	118.53	122.50
5	D	504	REG	C6-N1-C5	-2.27	117.39	121.76
2	B	502	NAD	C5A-C6A-N6A	2.26	123.79	120.35
2	C	501	NAD	C5A-C6A-N6A	2.21	123.72	120.35
2	A	501	NAD	C5A-C6A-N6A	2.16	123.63	120.35
3	A	502	ADE	C5-C6-N6	2.07	123.50	120.35
5	A	504	REG	C6-N1-C5	-2.00	117.90	121.76

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
5	D	504	REG	C7

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	NAD	O4D-C1D-N1N-C2N
2	A	501	NAD	O4D-C1D-N1N-C6N
2	A	501	NAD	C2D-C1D-N1N-C2N
2	A	501	NAD	C2D-C1D-N1N-C6N
2	B	502	NAD	O4D-C1D-N1N-C2N
2	B	502	NAD	O4D-C1D-N1N-C6N
2	B	502	NAD	C2D-C1D-N1N-C2N
2	B	502	NAD	C2D-C1D-N1N-C6N
2	C	501	NAD	O4D-C1D-N1N-C2N
2	C	501	NAD	O4D-C1D-N1N-C6N

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms
2	C	501	NAD	C2D-C1D-N1N-C2N
2	C	501	NAD	C2D-C1D-N1N-C6N
2	D	501	NAD	O4D-C1D-N1N-C2N
2	D	501	NAD	O4D-C1D-N1N-C6N
2	D	501	NAD	C2D-C1D-N1N-C2N
2	D	501	NAD	C2D-C1D-N1N-C6N
5	A	504	REG	N1-C6-C7-C8
5	A	504	REG	N1-C6-C7-O1
8	B	504	GOL	C1-C2-C3-O3
8	B	506	GOL	O1-C1-C2-C3
8	D	505	GOL	O1-C1-C2-C3
8	D	505	GOL	C1-C2-C3-O3
8	D	505	GOL	O1-C1-C2-O2
8	B	504	GOL	O1-C1-C2-C3
8	B	504	GOL	O1-C1-C2-O2
8	B	504	GOL	O2-C2-C3-O3
8	B	506	GOL	O1-C1-C2-O2
8	D	505	GOL	O2-C2-C3-O3
5	D	504	REG	C7-C6-N1-C5
2	A	501	NAD	O4B-C4B-C5B-O5B
2	B	502	NAD	O4B-C4B-C5B-O5B
8	B	506	GOL	C1-C2-C3-O3
2	C	501	NAD	O4B-C4B-C5B-O5B
2	D	501	NAD	O4B-C4B-C5B-O5B

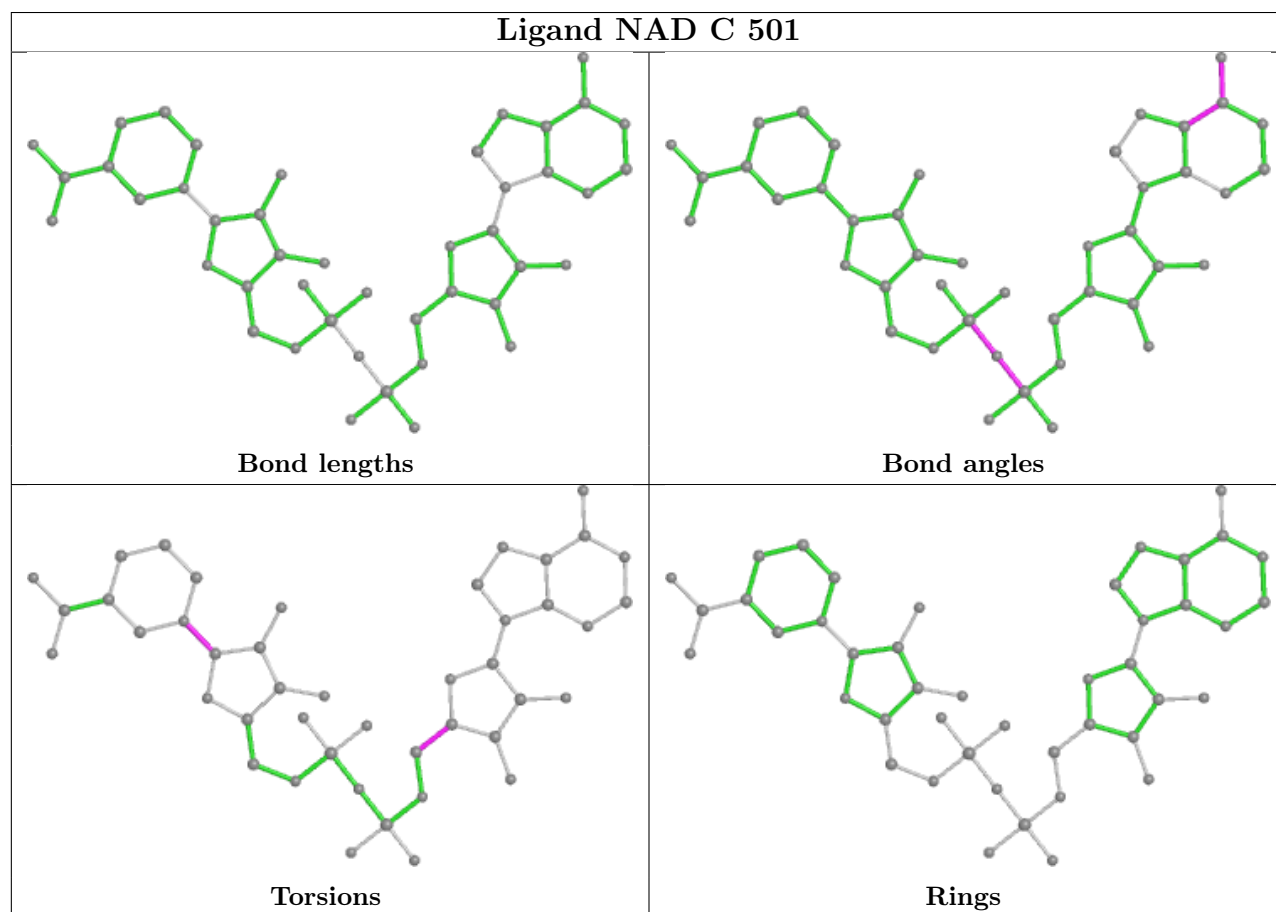
There are no ring outliers.

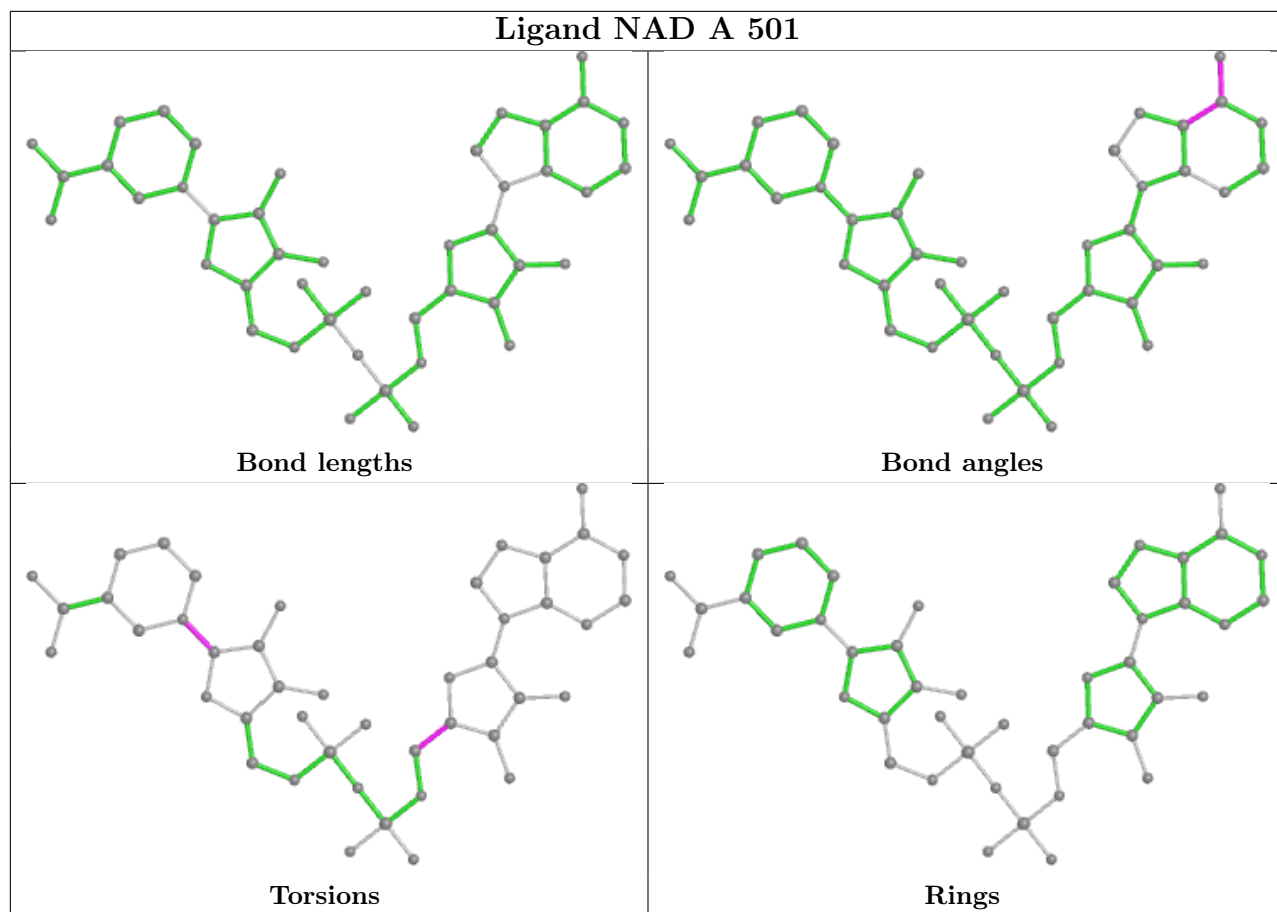
9 monomers are involved in 10 short contacts:

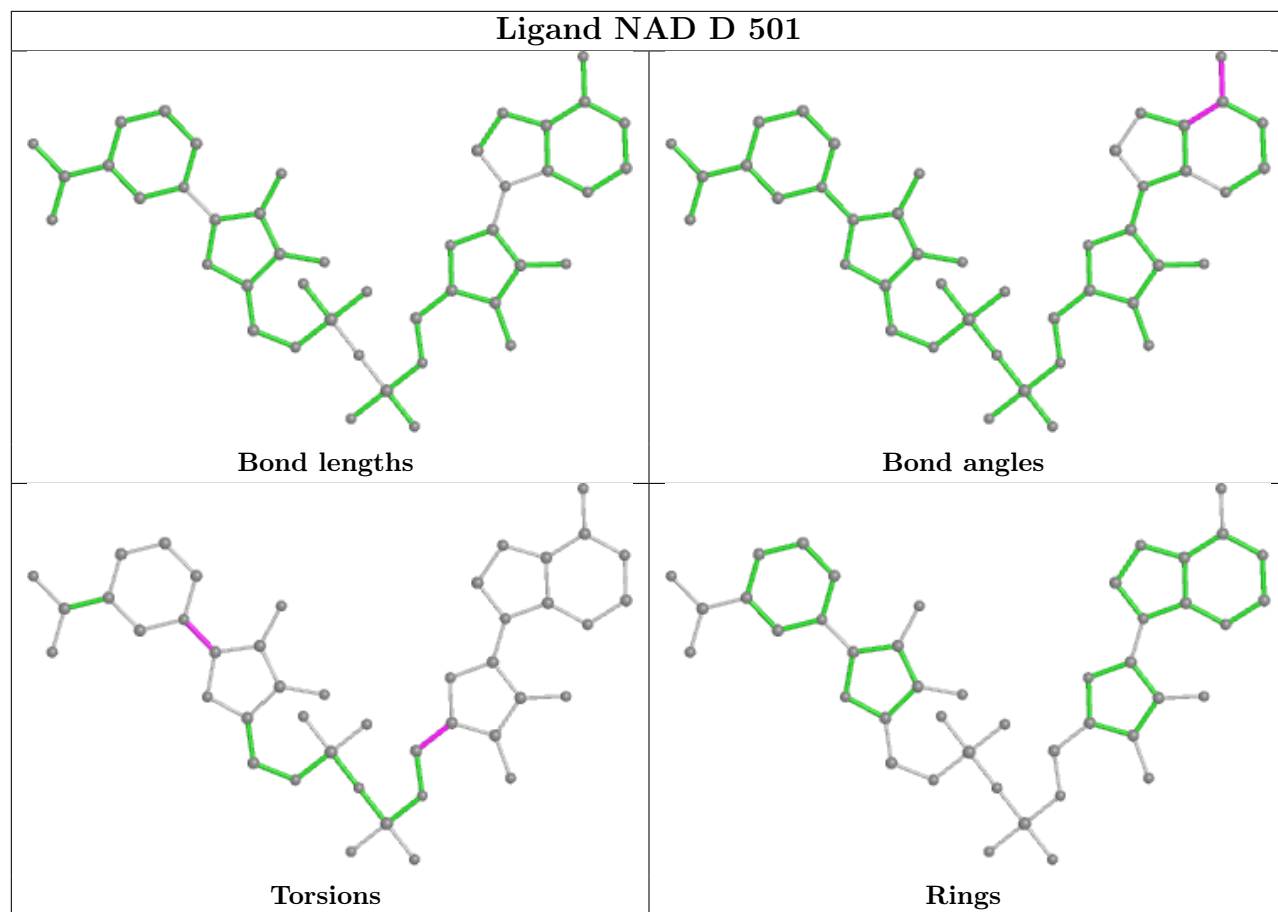
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	507	PO4	1	0
7	A	509	PO4	1	0
2	C	501	NAD	1	0
8	B	504	GOL	1	0
7	C	504	PO4	1	0
2	B	502	NAD	1	0
8	D	505	GOL	2	0
5	D	504	REG	1	0
7	B	508	PO4	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

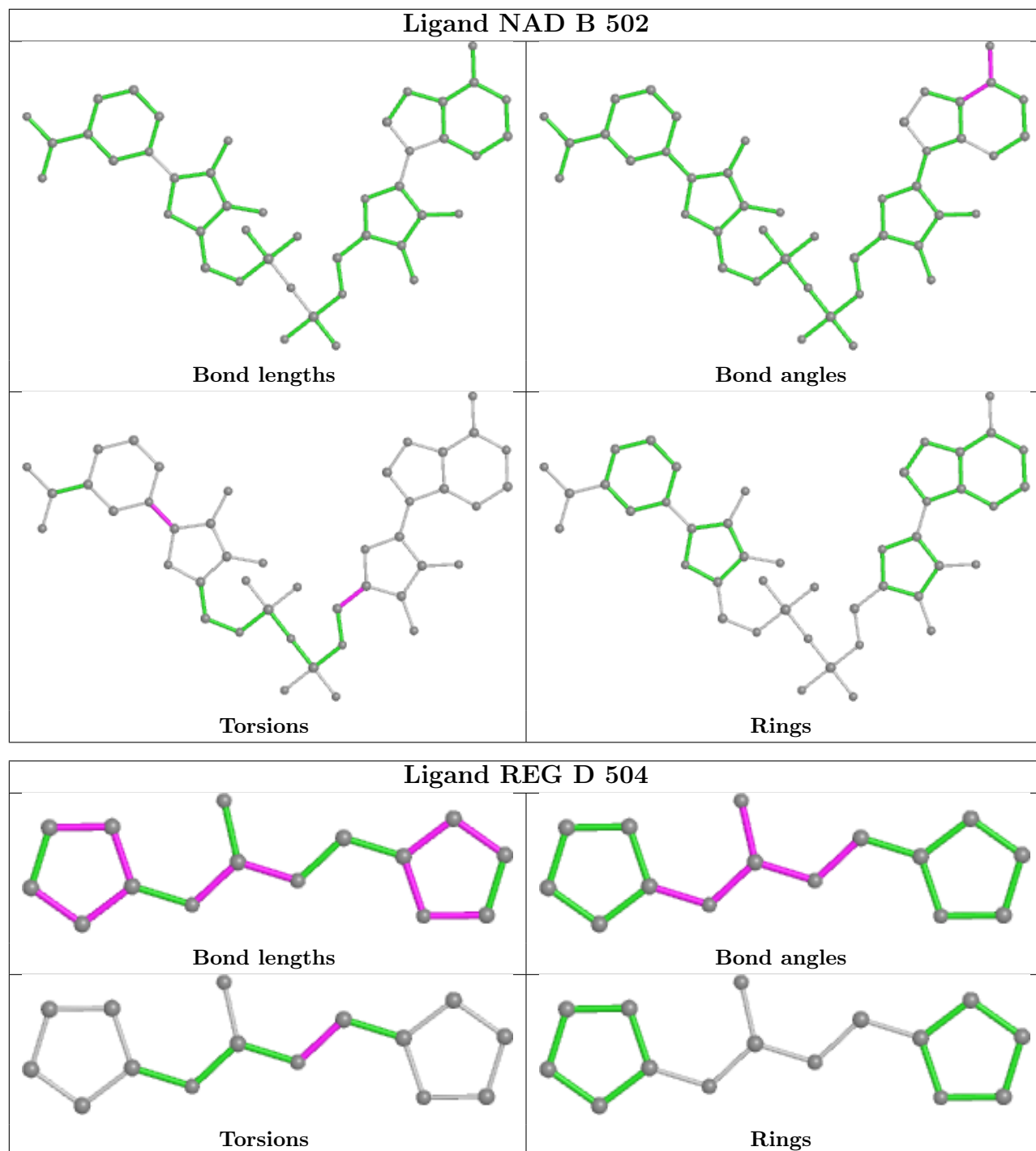
also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

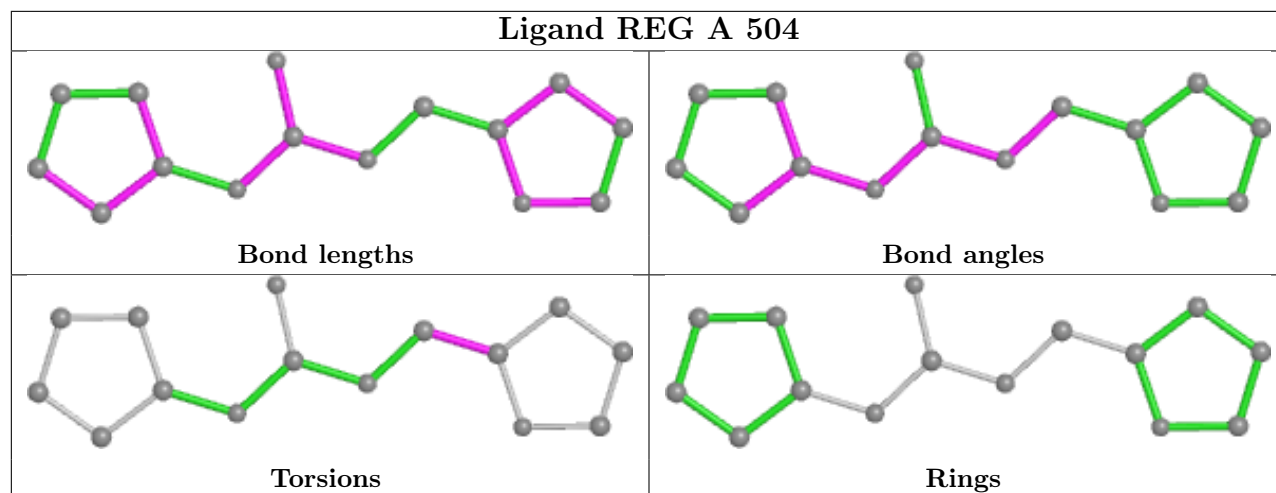












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	464/472 (98%)	-0.27	12 (2%) 56 53	20, 29, 51, 90	0
1	B	461/472 (97%)	-0.31	6 (1%) 77 77	19, 27, 44, 75	0
1	C	460/472 (97%)	-0.01	29 (6%) 20 18	20, 33, 58, 88	0
1	D	462/472 (97%)	-0.20	13 (2%) 53 50	22, 30, 48, 77	0
All	All	1847/1888 (97%)	-0.20	60 (3%) 47 44	19, 30, 51, 90	0

All (60) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	411	ALA	8.6
1	C	412	ALA	7.6
1	A	412	ALA	7.2
1	D	8	ALA	6.5
1	D	9	GLY	5.0
1	C	410	PRO	4.7
1	A	355	ASP	4.6
1	B	355	ASP	4.6
1	C	355	ASP	4.6
1	C	415	ALA	4.6
1	B	354	LYS	4.4
1	A	411	ALA	4.2
1	C	413	GLU	4.1
1	C	157	ARG	3.8
1	D	356	GLY	3.8
1	C	409	LEU	3.8
1	C	130	PRO	3.7
1	C	354	LYS	3.6
1	A	416	LYS	3.3
1	C	414	LYS	3.3
1	C	155	LEU	3.3

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	C	416	LYS	3.2
1	C	129	GLN	3.1
1	C	176	LEU	3.1
1	D	335	LYS	3.0
1	D	354	LYS	3.0
1	A	413	GLU	2.9
1	A	177	LYS	2.9
1	D	352	THR	2.8
1	D	355	ASP	2.7
1	C	418	LEU	2.7
1	D	204[A]	ARG	2.7
1	C	417	ARG	2.6
1	C	356	GLY	2.5
1	A	6	THR	2.5
1	A	353	GLY	2.5
1	D	177	LYS	2.5
1	A	181	LEU	2.5
1	D	10	PHE	2.4
1	A	415	ALA	2.4
1	C	131	TRP	2.3
1	B	247	VAL	2.3
1	A	204[A]	ARG	2.3
1	B	356	GLY	2.3
1	C	153	GLN	2.3
1	C	149	LYS	2.2
1	A	409	LEU	2.2
1	C	10	PHE	2.2
1	C	11	THR	2.2
1	C	407	ALA	2.2
1	D	353	GLY	2.2
1	C	156	GLU	2.1
1	C	151	TYR	2.1
1	B	204[A]	ARG	2.1
1	D	280	GLU	2.1
1	C	152	PRO	2.0
1	C	357	PHE	2.0
1	D	279	THR	2.0
1	C	127	ASP	2.0
1	B	353	GLY	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

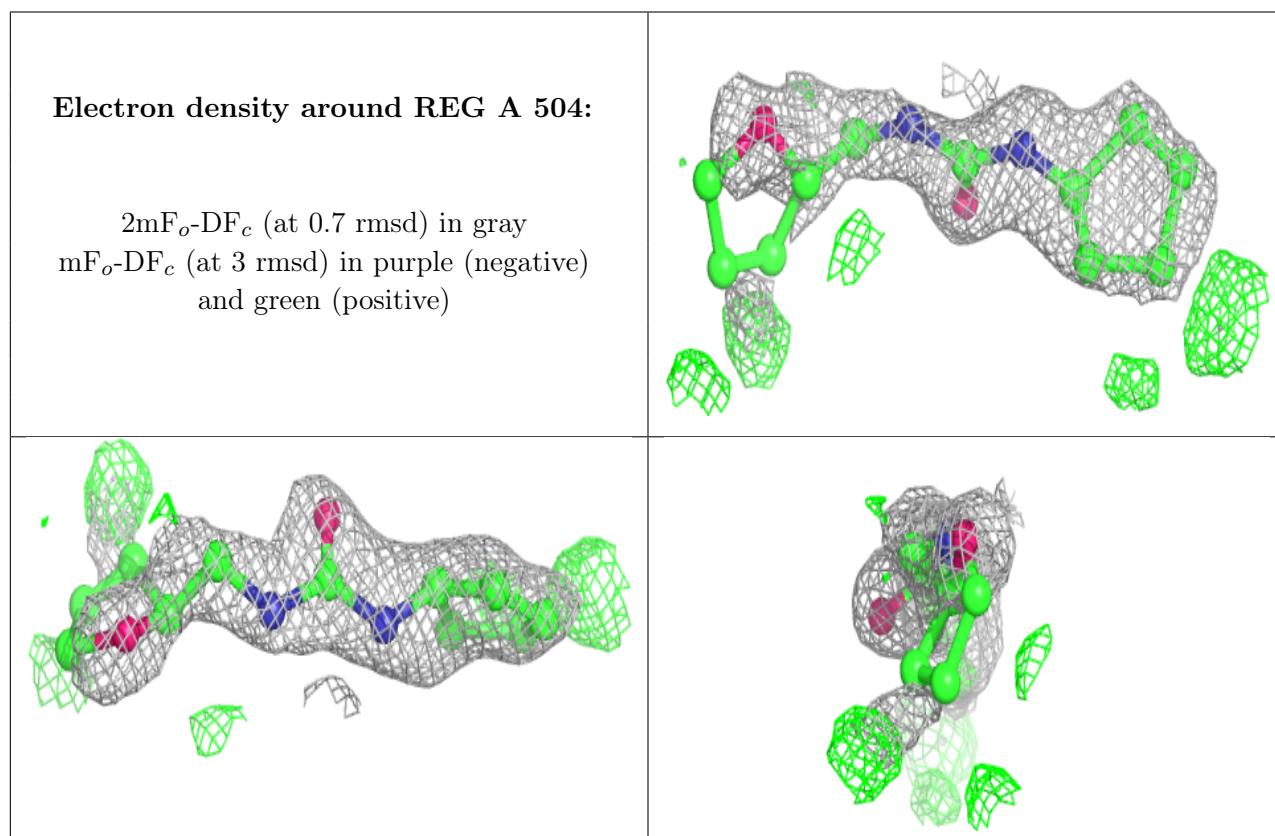
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
4	DMS	A	503	4/4	0.82	0.18	34,40,54,69	0
8	GOL	D	505	6/6	0.82	0.19	30,45,51,61	0
5	REG	A	504	15/15	0.85	0.17	35,48,64,67	15
5	REG	D	504	15/15	0.88	0.13	29,39,55,56	15
8	GOL	B	504	6/6	0.91	0.12	38,44,48,49	0
8	GOL	D	503	6/6	0.92	0.16	31,41,44,45	0
7	PO4	B	508	5/5	0.93	0.12	40,41,44,46	5
7	PO4	B	509	5/5	0.93	0.11	23,25,32,34	5
7	PO4	B	510	5/5	0.93	0.11	40,43,50,51	5
8	GOL	B	501	6/6	0.94	0.09	28,36,41,42	0
7	PO4	A	508	5/5	0.94	0.10	30,31,36,41	0
8	GOL	B	505	6/6	0.94	0.15	34,44,46,50	0
7	PO4	D	508	5/5	0.94	0.07	27,33,39,40	0
7	PO4	D	509	5/5	0.94	0.11	39,41,50,50	5
7	PO4	D	507	5/5	0.95	0.17	39,41,43,43	5
7	PO4	A	506	5/5	0.95	0.15	34,38,41,46	5
7	PO4	C	505	5/5	0.95	0.12	33,35,43,46	0
7	PO4	C	506	5/5	0.95	0.12	35,38,43,46	5
3	ADE	C	502	10/10	0.96	0.06	28,30,34,34	0
8	GOL	B	506	6/6	0.96	0.10	31,36,38,42	0
7	PO4	C	504	5/5	0.96	0.12	37,41,48,49	5
7	PO4	A	509	5/5	0.96	0.10	37,42,43,46	5
7	PO4	C	507	5/5	0.97	0.12	37,43,46,48	0
3	ADE	A	502	10/10	0.97	0.07	21,24,26,27	0
3	ADE	D	502	10/10	0.97	0.06	21,24,25,26	0
3	ADE	B	503	10/10	0.97	0.12	21,22,24,24	0
7	PO4	A	507	5/5	0.97	0.09	32,35,39,39	5

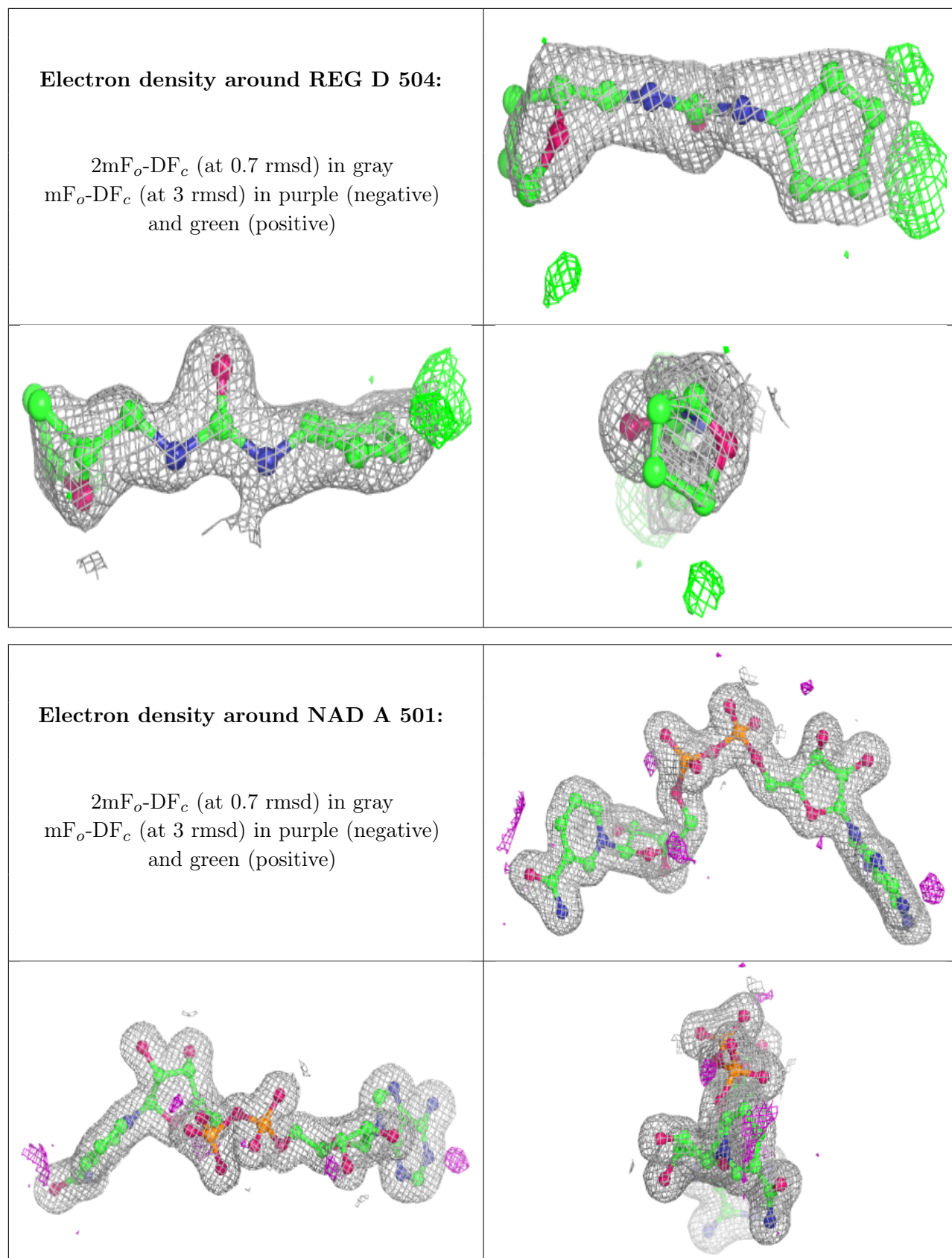
*Continued on next page...*

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NAD	A	501	44/44	0.98	0.06	19,23,25,28	0
2	NAD	B	502	44/44	0.98	0.07	19,24,26,30	0
7	PO4	B	511	5/5	0.98	0.06	27,29,31,33	5
2	NAD	C	501	44/44	0.98	0.05	21,24,28,30	0
2	NAD	D	501	44/44	0.98	0.05	21,24,30,31	0
7	PO4	D	510	5/5	0.98	0.11	31,37,38,39	0
6	K	C	503	1/1	0.99	0.07	26,26,26,26	0
6	K	D	506	1/1	0.99	0.07	24,24,24,24	0
6	K	A	505	1/1	1.00	0.07	23,23,23,23	0
6	K	B	507	1/1	1.00	0.06	21,21,21,21	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

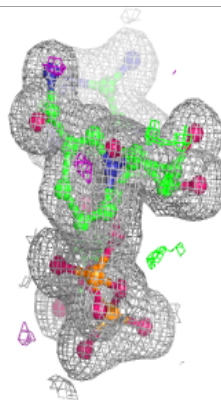
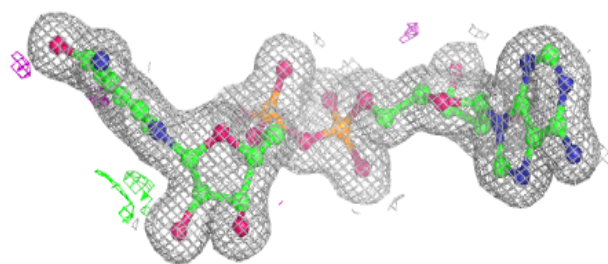
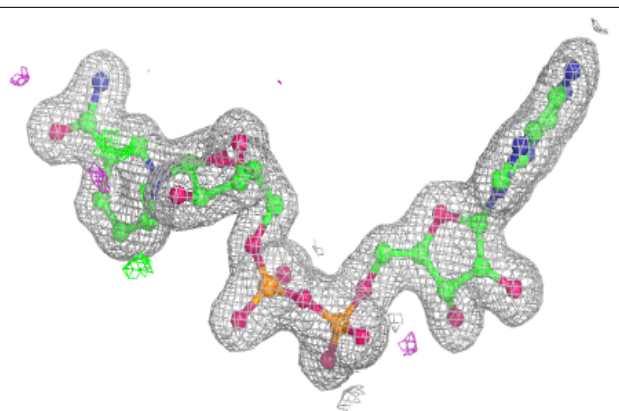




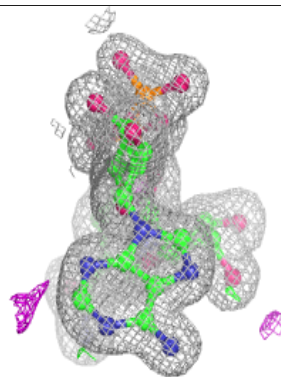
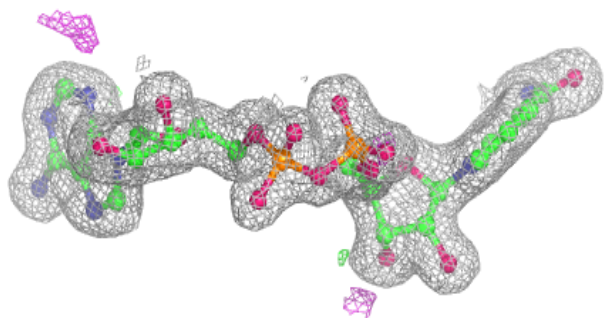
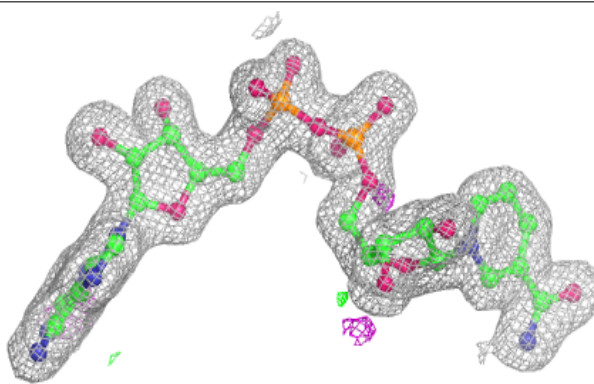


**Electron density around NAD B 502:**

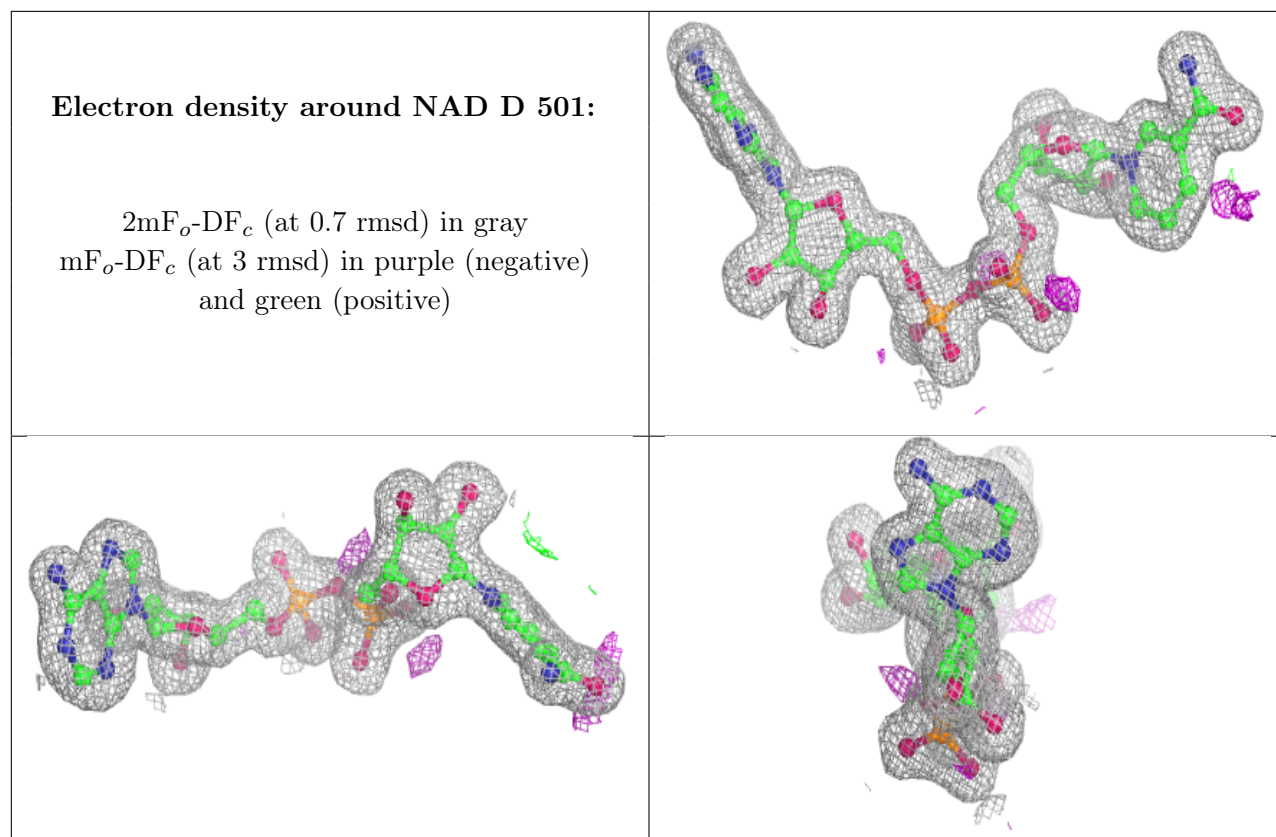
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)

**Electron density around NAD C 501:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)







## 6.5 Other polymers [i](#)

There are no such residues in this entry.